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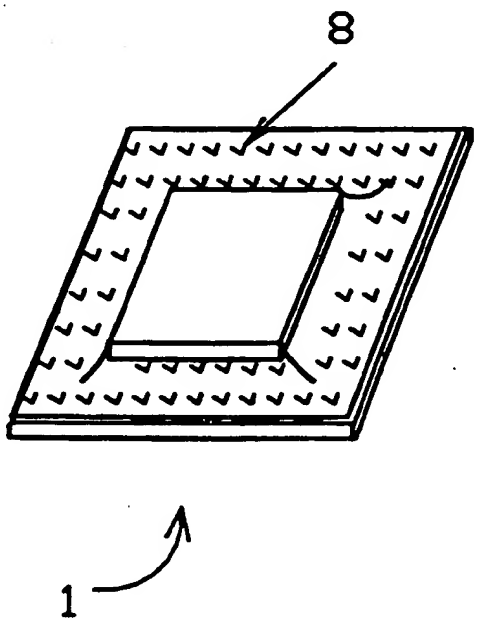
(54) Title: PROCEDURE AND EQUIPMENT FOR THE MANUFACTURE OF SKIN-PACKINGS AND SUCH A SKIN-PACKING



(57) Abstract

Procedure and equipment for producing a skin-packing - consisting of a carrying sheet (1) mainly made of cardboard or corrugated pasteboard and a plastic film (8) - that makes it possible to separate the carrying sheet and the plastic film completely when opening the packing. The procedure that will be marketed under the name The TEPA-System, possesses the advantage that the parts of which a skin-packing consists can be recirculated. This is possible as there are no remnants of the carrying sheet on the plastic film or reverse, when the package is opened.

Procedure and Equipment for the Manufacture of Skin-Packings and such a Skin-Packing.

The present invention concerns a procedure for the manufacture of a skinpacking by which a subject is placed on a carrying sheet mainly made of paper pulp. Then a heated plastic film is placed over the subject, shrinked around it and fastened to the carrying sheet as the plastic film is pulled against the front of the carrying sheet on which the subject is placed, by exposing the back of the carrying sheet to a vacuum.

Skinpacking is a way to pack by which the subject to be packed is enclosed between a normally porous carrying sheet, principally board or corrugated paper, and a plastic film that by means of a vacuum applied through the carrying sheet is wrapped tightly around the subject. Normally a transparent plastic film is used, so the subject is visible through the film. According to known procedures the plastic film is attached to the carrying sheet by joining the film and the carrying sheet with adhesive added to the whole surface of either the film or the carrying sheet. The packed subject is unpacked by separating the carrying sheet and the plastic film.

One skinpacking procedure consists in placing the product to be packed on the carrying sheet. The plastic film is coated with a thin layer of adhesive, heated and then shrinked around the subject by exposing the porous carrying sheet to a vacuum from the opposite side of the one the subject is placed on. The plastic film is then pressed against the carrying sheet and fastened to it by means of the thin coating of adhesive applied to the surface of the plastic film facing the carrying sheet and the subject. The disadvantage of this method is that the adhesive applied to the plastic film also sticks to the subject, and not only to the carrying sheet. If the subject to be packed is painted, lacquered or the surface treated in another way, there is a risk that this surface coating will be removed or damaged when the packing is opened by separating the plastic film and the carrying sheet.

This disadvantage is attempted eliminated by another skinpacking procedure. The process stages are the same as in the above

procedure, but the difference between this and the above mentioned procedure is that the whole surface of the carrying sheet, instead of the plastic film, is coated with a thin layer of adhesive. The risk of damaging the packed subject's surface coating, if any, when opening the packing, is hereby reduced.

The two above mentioned procedures of skinpacking both have one substantial disadvantage. If the carrying sheet and the plastic film are joined by coating the surface of either the carrying sheet or the plastic film with adhesive, a surface layer of the carrying sheet will stick to the plastic film or a part of the plastic film will stick to the carrying sheet, when the packing is opened by separating the plastic film and the carrying sheet.

The future times' hard environmental requirements imply among others requirements of recirculation of many of the materials used for packing rather than destruction by combustion or accumulation in dumps. Therefore it must be possible to separate the packing completely in separate parts within the materials that the packing might consist of, such as plastic, cardboard, paper, metal etc.

The before mentioned procedures of skinpacking do not fulfil this requirement, as they as mentioned have the disadvantage that the different materials of which the packing consist, and which in the case of skinpacking are plastic, cardboard or paper respectively, are not completely separated. A surface layer of the carrying sheet will always stick to the plastic film or a part of the plastic film will stick to the carrying sheet.

This disadvantage can be avoided through a third known skinpacking procedure, where the carrying sheet and the subject is shrinked-on plastic film on both sides, i.e. on both the side of the carrying sheet on which the subject is placed and the back of the carrying sheet. The plastic film is streched over the edges of the carrying sheet, and the upper and lower layer of the plastic film are welded together along the edge. This

skinpacking procedure possesses nevertheless several other disadvantages. First of all the consumption of plastic increases by the double, as there have to be a coating on both the front and back of the carrying sheet. Besides, it is necessary to perforate the lower layer of plastic film and hereby admit the vacuum that the back of the carrying sheet is exposed to, to the upper layer of the plastic film. The speed, the simple process and the low consumption of material, which characterize skinpacking, are no longer present to an satisfactory extend.

It is thus, the purpose of the present invention to show a way of skinpacking that consist of a carrying sheet that a plastic film is attached to, but only to that side of the carrying sheet on which the subject is placed. This procedure implies that the plastic film and the carrying sheet succeedingly can be separated completely, when the packing is opened.

This is obtained from a procedure destinctive in that way that the carrying sheet is stamped with the formation of pits on the front before the plastic film is attached to it, that adhesive is applied to the pits, and that the plastic film is pulled down into the pits when the carrying sheet is exposed to the vacuum.

With this procedure that will be marketed under the name The TEPA-System, the plastic film and the carrying sheet are only jointed slightly but enough to secure a subject between these packing elements. The number of pits per unit area of the carrying sheet and the size and depth of these are determined in consideration of the size and weight of the subject to be packed, the presentation, surface and thickness of the carrying sheet and the plastic film's physical qualities.

A layer of adhesive is applied to the surface of the pits to secure the plastic film in the pits even better. Using this way of joining the two packing elements, by using adhesive in the pits only, only a small part of the elements' total surface is joined, which increase the possibilities of recirculation.

The stamping of the carrying sheet can be done in such a way, that a perforation with through-going holes is made. The vacuum that the back of the carrying sheet is exposed to, will in this case pull the plastic film against the carrying sheet through this perforation. The demand on the porosity of the carrying sheet is then reduced considerably. It will thus, be possible to apply a glazing or another kind of coating to the carrying sheet that cause the plastic film to get a certain adhesion to the parts of the surface of the carrying sheet which are not perforated.

The carrying sheet can be stamped in a way so only a part of the surface is provided with pits and the other part is perforated and hereby provided with holes. This makes it easier to transfer the vacuum's pull to the plastic film covering the part of the surface which has been pierced.

The equipment to be used for the procedure according to the invention is intended to process the carrying sheet by transporting the carrying sheet between the processing elements, and the device is peculiar as it consists of a first element supporting the carrying sheet, a second element fitted with spikes to make the pits in the carrying sheet, and as the device has arrangements to apply adhesive to the spikes.

The equipment can consist of a conveyor belt or roller placed opposite a cylinder or a corresponding device fitted with spikes for the stamping or piercing. The carrying sheet is transported through a slit between the conveyor belt/roller and the cylinder fitted with spikes. If the points of the spikes do not touch or overlay the bearing surface of the conveyor belt or the periphery of a corresponding conveyor roller, a stamping in the form of pits in the carrying sheet will be made. If the spikes do touch or overlay, a perforation in the form of holes in the carrying sheet will be made.

Is adhesive applied to the spikes before they touch the carrying sheet, a layer of adhesive will be deposited in the pits or

on the surface of the holes. Still, this adhesive will also be deposited on the surface of the holes if the adhesive is applied to the back of the carrying sheet, where a part of this adhesive will be leaft on the surface of the holes.

After the carrying sheet has been processed by the cylinder fitted with spikes, the rest of the procedure will go on traditionally according to the first two of the above-mentioned known procedures, but with the difference that no adhesive is applied to neither the surface of the carrying sheet or the surface of the plastic film. The subject to be packed is placed on the front of the carrying sheet and a heated plastic film is shrinked around the subject and pulled against the carrying sheet by exposing the back of the carrying sheet to a vacuum.

The first part of the process where the carrying sheet is stamped or perforated, can be made self-containingly and independently of the rest of the process, i.e. the packing of the subject.

A skinpacking made by the procedure in accordance with the invention consists of a carrying sheet and a plastic film that is attached to one side of the carrying sheet and surround a subject that is placed between the surface of the carrying sheet and the plastic film. This skinpacking is peculiar as the carrying sheet is stamped by means of which pits are made in the carrying sheet, and as the part of the plastic film that covers the pits is pulled down into the pits.

If the plastic film is glazed or coated in another way in order to reduce the surface roughness, there will besides, be some adherence to the plastic film between the pits or holes.

In the following the invention will be explained in detail with reference to the enclosed drawings, and

fig. 1-5 show stages of the process when using the procedure according to the invention,

fig. 6 shows a device for the performance of the procedure according to the invention, and

fig. 7 shows a skinpacking made by the procedure according to the invention.

Fig. 1 illustrates a carrying sheet 1. The carrying sheet 1 is mainly made of cardboard or corrugated board with a thickness t, that is determined so that the carrying sheet has a sufficient stifness to carry the subject. If the carrying sheet is made of corrugated board, this will mainly be mini-corrugated board, but it can be necessary to use stronger qualities of corrugated board for the packing of larger and heavier subjects.

The carrying sheet 1 is in a perferred embodiment porous, but if the carrying sheet for instance is coated, the surface can be hermetic.

The carrying sheet 1 can be preprinted with a text - such as product information, price, bar code, or other regarding the packed subject - that should be used in connection with the finished packing.

The carrying sheet 1's surface 2 can be glazed or treated in another way to reduce the surface's roughness and hereby increase the adhesion between the carrying sheet and a plastic film 8 that is fastened to the carrying sheet (see fig. 4).

The carrying sheet 1 can be divided into sections enabling several subjects to be skinpacked simultaneously, and then the single packings are separated by cutting the carrying sheet between the subjects.

Fig. 2A illustrates a carrying sheet 1 that has been prepared. The stamping in the shape of a number of pits 3 has been made. The number of pits, the depth of the pits and their distribution on the carrying sheet's surface 2 depends on several factors as mentioned in the introductory part of the description.

The pits 3 are conic, fig. 2B.

If the carrying sheet 1 is stamped so the pits 3 go all the way througe the carrying sheet 1, fig. 2C, holes 4 are made and the stamping of the carrying sheet will constitute a perforation. The holes 4 are conic as the pits 3 but can also be shaped as cylindrical holes. The holes 4's conic shape has the largest diameter at the surface 2 facing the plastic film 8 that is attached to the carrying sheet (see fig. 4). Still, the conic shape can also be made so the largest diameter is at the opposite surface 5 to the one that the plastic film is attached to.

A layer of adhesive is applied to the surface 6 of the pits 3 or the holes 4. The adhesive will secure the adherence to the plastic film that is subsequently attached to the carrying sheet.

Fig. 3 illustrates a subject 7 that is placed on the carrying sheet 1. The subject 7 that is to be packed is placed loosely on the stamped or perforated carrying sheet 1. Subsequently a complete shrinking of the plastic film around the subject 7 is made (see fig. 5), and the subject can therefore be placed arbitrarily within the surface 2 of the carrying sheet 1.

Fig. 4 illustrates how a heated plastic film 8 is transported across the stamped or perforated carrying sheet 1 on which the subject 7 is placed. The area of the plastic film 8 is at least as big as the area of the carrying sheet 1's surface 2 and perhaps a little larger. The plastic film 8 is only slightly heated in order to make it possible for the film to assume the shape of the subject 7 without sticking to it.

Fig. 5 illustrates the shrinking on of the plastic film 8 around the subject 7 and the attachment of the film to the carrying sheet 1. The back 5 of the carrying sheet 1 is exposed to a vacuum V, by means of which the plastic film 8 is pulled against the front of the carrying sheet. When the plastic film 8

touches the subject 7, the film will shrink around the subject. When touching the carrying sheet 1 the part of the surface of the plastic film 8 which covers the pits 3 or holes 4 will be pulled down into these. Because of the conic cross section of the pits 3 or holes 4, the plastic film 8 will bear against the surface 6 of the pits or holes. The adhesive applied to the surface 6 will secure the joining of the plastic film 8 and the carrying sheet 1. The plastic film 8 and the carrying sheet 1 will not be joined in the area between the pits/holes, why the part of the surface of the plastic film which is joined with the carrying sheet is very small.

The procedure illustrated and explained in connection with fig. 1-5 provides a skinpacking giving the possibility of total separation of the materials that form part of the packing. This is ensured by the part of the carrying sheet 1 and the plastic film 8 to be joined by using adhesive, being very small compared to the total surface area. When opening the packing by separating the carrying sheet 1 from the plastic film 8, only a small part of the carrying sheet 1's surface 2 that constitute of the pits 3' or holes 4' surface 6 stick to the plastic film 8 (or in the reverse order). This part of the surface 2 is very small and will not present any noticeable disadvantages in connection with the recycling of the different materials.

Fig. 6 illustrates a device for the performance of the procedure described in connection with fig. 1-5. A conveyor belt 10 has a bearing surface 11 and is driven by rollers 12. The carrying sheet 1 is placed on the conveyor belt 10's bearing surface 11 and the conveyor belt transports the carrying sheet through the different stags of the process I-V. Stage I can, if desired, be done independently or dependently of the following steps. This is illustrated with a stippling on the conveyor belt 10 between step I and the following steps.

A cylinder 13 fitted with spikes 14 is placed in a distance from the conveyor belt 10. The distance between the points 15 of the spikes 14 and the conveyor belt 10 is determined from

the knowledge of the thickness t of the used carrying sheet 1 and of the wanted depth of the pits 3. If a piercing of the carrying sheet is desired, the spikes 14 of the cylinder 13 overlay the conveyor belt 10's bearing surface 11. It must then be possible for the spikes 14 to pass the conveyor belt 10's bearing surface 11 without damaging this surface 11. This is done by providing the bearing surface 11 with holes where the spikes 14 pass the conveyor belt 10, or by making the conveyor belt 10 or its surface 11 yielding. The shape and length of the spikes 14 and their location on the cylinder 13's circumference 16 determine the stamping or perforation (step I) made in the carrying sheet 1. An adhesive is applied to the points 15 of the spikes 14 before they are led down to the carrying sheet 1. Subsequently this adhesive is deposited on the surface 6 of the pits 3 or holes 4 made by the stamping or perforation respectively.

If a perforation is made during the preparation of the carrying sheet 1, it is possible to apply the adhesive to the back 5 of the carrying sheet, as an alternative to applying the adhesive to the points 15 of the spikes 14. A part of this adhesive will float into the holes 4 from the back of the carrying sheet.

During step II the subject 7 to be packed is placed on the stamped or perforated carrying sheet 1. During step III the heated plastic film 8 is guided across the carrying sheet 1 on which the subject 7 is placed. Succeedingly, during step IV, the back 5 of the carrying sheet 1 is exposed to a vacuum V, by means of which the plastic film 8 is pulled down towards the subject 7 and the carrying sheet 1. During step V the plastic film 8 is pulled completely down around the subject 7 and into the pits 3 or holes 4 in the carrying sheet 1. When the film 8 is cooled off the skinpacking is completed and the subject 7 is packed and ready for further distribution.

As an alternative to the part of the conveyor belt 10 that passes the cylinder 13 fitted with spikes 14, a conveyor roller can be used, and as alternative to the cylinder 13 a corre-

sponding device fitted with spikes can be used.

Fig. 7 illustrates a skinpacked subject 7 packed in accordance with the procedure described in connection with fig. 1-5. The package consist of the carrying sheet 1, the subject 7 and the plastic film 8. The plastic film 8 is shrinked around the subject 7 so that the film fits tightly to the subject and secures the subject in the package. The film 8 is attached to the carrying sheet 1, as it is pulled down into the pits 3 and joined with the carrying sheet on the surface 6 of the pits 3 by using adhesive.

When the skinpackage is opened to remove the subject 7, this is done by separating the carrying sheet 1 from the plastic film 8. Because of the very limited joining of these two parts, they will broadly be separated completely. If the adhesive isn't very strong, the two package parts can be separated completely. It is now possible to recirculate these parts, as none or only a small part of the carrying sheet sticks to the surface of the plastic film 8 or reverse, there are no or only few remnants of the surface 2 of the plastic film 8 on the carrying sheet 1.

P A T E N T C L A I M

1. The procedure for the manufacture of a skinpackage by which a subject (7) is placed on a carrying sheet (1) that is mainly made of paper pulp, then a heated plastic film (8) is placed over the subject, shrinked around it and attached to the carrying sheet by pulling the plastic film against the front (2) of the carrying sheet on which the subject is placed, by exposing the back (5) of the carrying sheet to a vacuum (V), c h a r a c t e r i z e d by the carrying sheet (1) being stamped by making pits (3) in the front (2) before the plastic film (8) is attached to it, by adhesive being applied to the pits and the plastic film being pulled down into the pits, when the carrying sheet is exposed to a vacuum (V).

2. The procedure according to claim 1 c h a r a c t e r i z e d by the pits (3) being pierced through the thickness (t) of the carrying sheet (1), and the carrying sheet being perforated when making the holes (4).

3. The procedure according to claim 1 and 2, c h a r a c t e r i z e d by a first part of the carrying sheet (1) being stamped and the other part of the carrying sheet being perforated.

4. The procedure according to claim 1-2, c h a r a c t e r i z e d by the making of a perforation and by applying adhesive to the pits (3) from the back (5) of the carrying sheet (1).

5. The device to be used for the procedure according to any of the above claims, and that is intended to prepare the carrying sheet (1) by transporting it between the processing elements is c h a r a c t e r i z e d by consisting of a first element (10) to support the carrying sheet, a second element (13) fitted with spikes (14) for the making of pits (3) in the carrying sheet, and by the device including arrangements to apply adhesive to the surface (6) of the pits (3).

6. Device according to claim 5, c h a r a c t e r i z e d by the first element being a belt (10) with a broadly plane surface (11), and by the second element being a cylinder (13).

7. Device according to claim 5-6, c h a r a c t e r i z e d by spikes (14) of different length.

8. A skinpackage made in accordance with the procedure according to claim 1-3 and consisting of a carrying sheet (1) and a plastic film (8) that is attached to one surface of the carrying sheet and include a subject (7) placed between the surface of the carrying sheet and the plastic film, c h a r a c t e r i z e d by the carrying sheet (1) being stamped, by means of which pits (3) in the carrying sheet are made, and by the part of the plastic film (8) which covers the pits (3) being pulled down into these.

9. A skinpacking according to claim 6 c h a r a c t e r i z e d by the surface (6) of the pits (3) being shaped as a part of a conic surface.

10. A skinpacking according to claim 6 and 7 c h a r a t e r i z e d by the carrying sheet (1) being faced to make the surface of the side (2) to which the plastic film (8) is to be attached to, smooth.

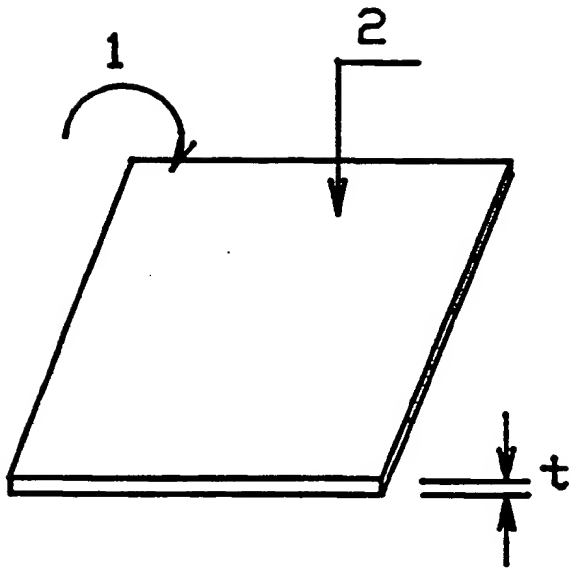


FIG. 1

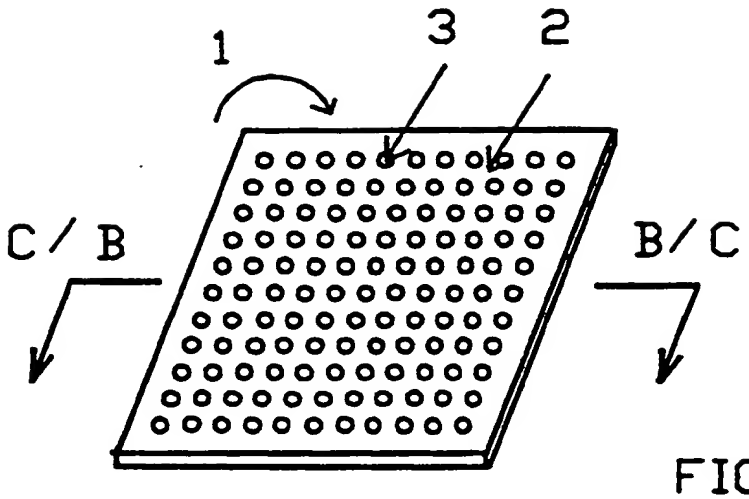


FIG. 2 A

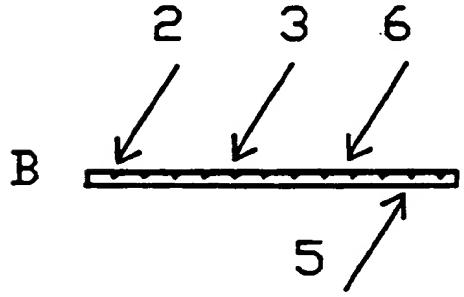


FIG. 2 B

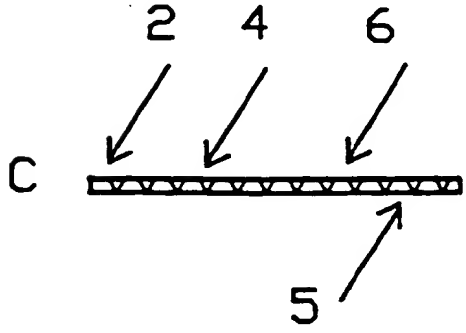


FIG. 2 C

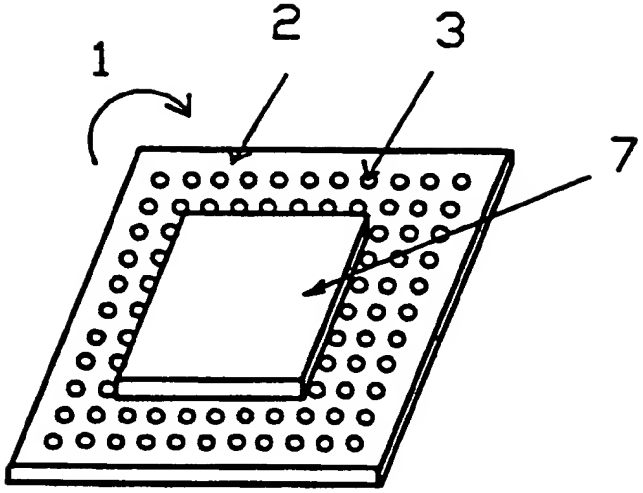


FIG. 3

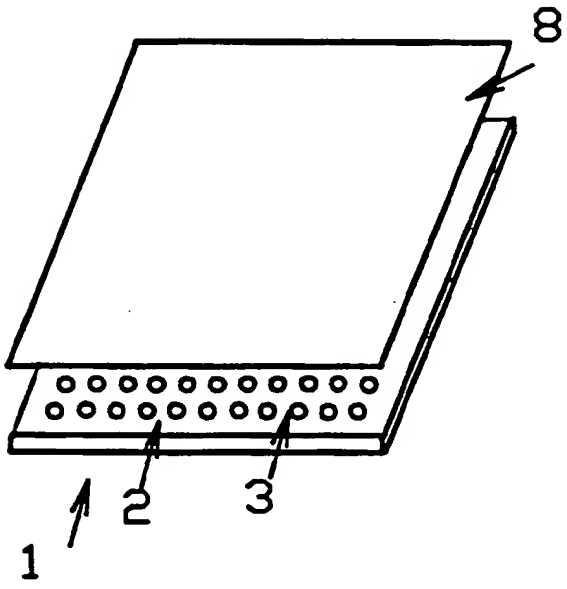


FIG. 4

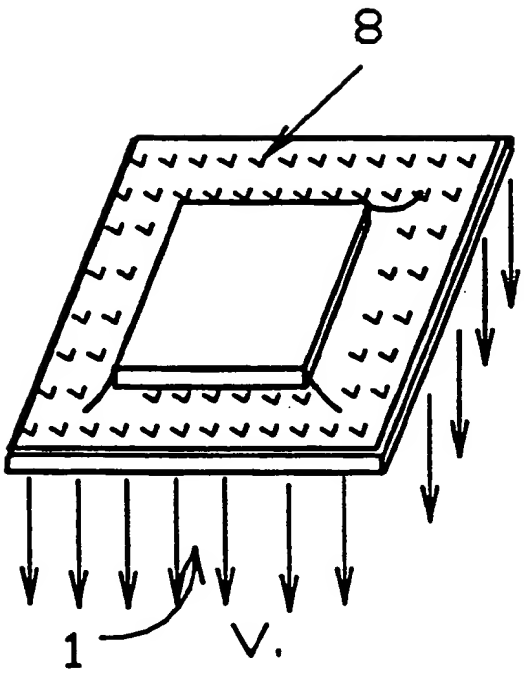


FIG. 5

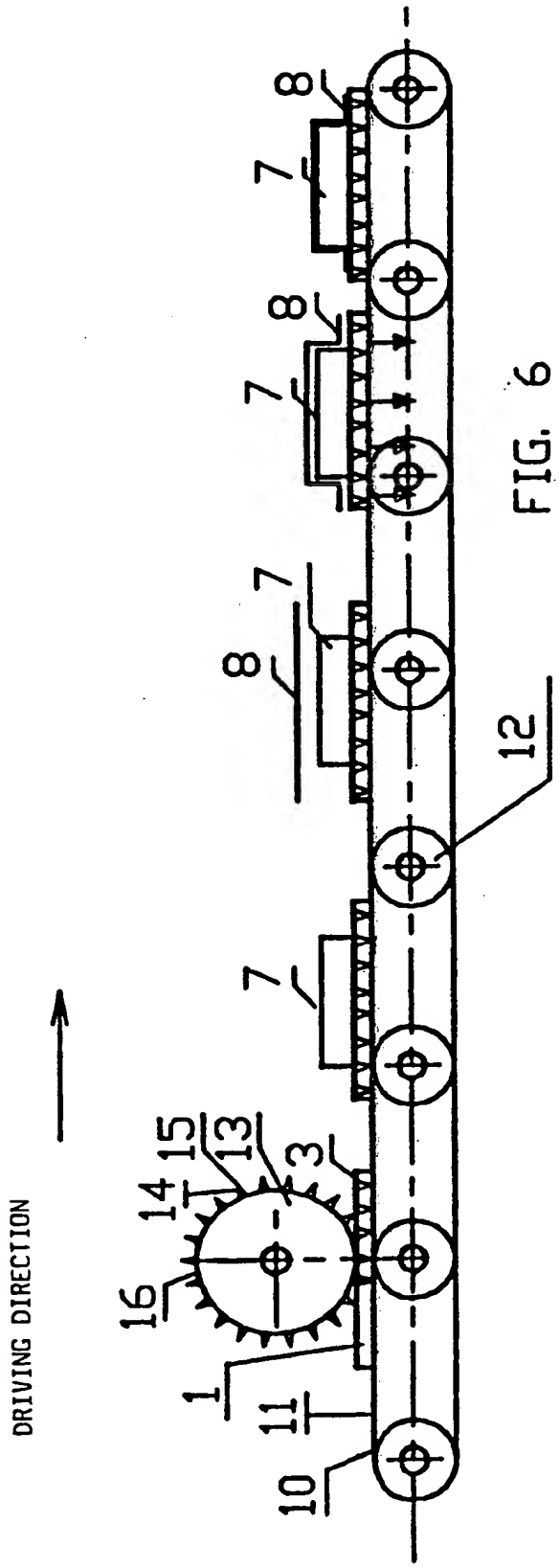


FIG. 6

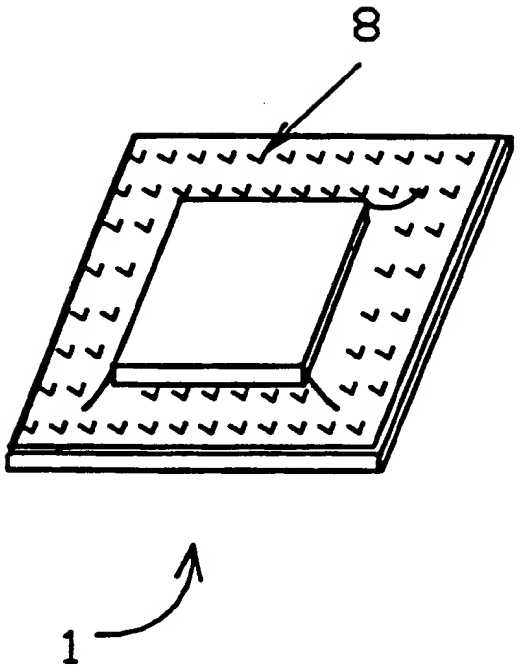


FIG. 7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/DK 93/00177

A. CLASSIFICATION OF SUBJECT MATTER

IPC5: B65B 11/52, B65D 75/36
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC5: B65B, B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, A, 3861529 (COLEMAN), 21 January 1975 (21.01.75), figures 3,4	1,8
Y	SE, B, 446850 (SANFORD REDMOND), 13 October 1986 (13.10.86), page 10, line 27 - line 34, figure 4a	1,8
A	DE, A1, 2725172 (BAKER PERKINS HOLDINGS LTD.), 15 December 1977 (15.12.77)	1,5,8
A	US, A, 2989827 (F.A. GROTH), 27 June 1961 (27.06.61)	1,8

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents:
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"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
8 Sept 1993	10 -09- 1993
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/DK 93/00177

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO, A1, 9201553 (MAX-PLANCK-GESELLSCHAFT ZUR FÖRDERUNG DER WISSENSCHAFTEN E.V.), 6 February 1992 (06.02.92) —	1,8
A	US, A, 2861404 (E.B. STRATTON, JR), 25 November 1958 (25.11.58) —	1,2,8